

introducing a feedstock gas having a high temperature-melting point metal in its structure, and a reductive nitrogen-containing gas comprising a nitrogen atom into said vacuum atmosphere; and

*0*  
*long*  
forming a film of the nitride of said high temperature-melting point metal on said substrate.

wherein a nitrogen-free auxiliary reductive gas is introduced into said vacuum atmosphere.

2. (Amended) The process for producing a barrier film by the heat CVD method according to claim 1, which comprises a step of introducing said auxiliary reductive gas together with said feedstock gas and said reductive nitrogen-containing gas into said vacuum atmosphere.

*P*  
*204*  
*pub*  
*(2)*  
3. (Amended) The process for producing a barrier film by the heat CVD method according to claim 2, which further comprises a step of introducing said feedstock gas and said auxiliary reductive gas into said vacuum atmosphere without introducing said reductive nitrogen-containing gas.

4. (Amended) The process for producing a barrier film by the heat CVD method according to claim 2, wherein, in the step of introducing said auxiliary reductive gas together with said reductive nitrogen-containing gas and said feedstock gas, said reductive nitrogen-containing gas is introduced at a flow rate once or more higher than the flow rate of said feedstock gas, and said

auxiliary reductive gas is introduced at a flow rate once or more but not more than 10 times higher than the flow rate of said reductive nitrogen-containing gas.

5. (Amended) The process for producing a barrier film by the heat CVD method according to claim 1, wherein, in the step of introducing said auxiliary reductive gas together with said reductive nitrogen-containing gas and said feedstock gas, said reductive nitrogen-containing gas is introduced at a flow rate once or more but not more than 5 times higher than the flow rate of said feedstock gas, and said auxiliary reductive gas is introduced at a flow rate 2 times or more but not more than 10 times higher than the flow rate of said reductive nitrogen-containing gas.

6. (Amended) The process for producing a barrier film by the heat CVD method according to claim 2, wherein, in the step of introducing said auxiliary reductive gas together with said reductive nitrogen-containing gas and said feedstock gas, said auxiliary reductive gas is introduced at a flow rate once or more but not more than 15 times higher than the flow rate of the feedstock gas having said high temperature-melting point metal.

7. (Amended) The process for producing a barrier film by the heat CVD method according to claim 1, wherein, in the step of growing the film of the nitride of said high temperature-melting point metal, a diluent gas not reacting with said high temperature-melting point metal and a gas having an oxygen atom in its chemical structure are introduced so that the pressure of said vacuum atmosphere is regulated to 1 Pa or more but not more than 100 Pa.

8. (Amended) A process for producing a barrier film by the heat CVD method for forming a barrier film made of a ~~thin~~ film of the nitride of a high temperature-melting point metal on a substrate, wherein the surface of said substrate is exposed to a plasma of hydrogen gas and a plasma containing at least one gas selected from among argon, nitrogen and helium gases, and then the ~~thin~~ film of the nitride of said high temperature-melting point metal is formed on the surface of the substrate.

Please add claims 11 - 17 as follows:

11. A process for producing a barrier film which comprises the steps of:

providing a substrate in a vacuum atmosphere:

introducing a feedstock gas having a high temperature-melting point metal in its

structure, and a  $\text{NH}_3$  gas into said vacuum atmosphere; and

forming a film of the nitride of said high temperature-melting point metal on said

substrate,

wherein a reductive Si-containing gas is introduced into said vacuum atmosphere.

12. The process for producing a barrier film according to claim 11, which comprises a step of introducing said reductive Si-containing gas together with said feedstock gas and said  $\text{NH}_3$  gas into said vacuum atmosphere.

13. The process for producing a barrier film according to claim 12, which further

65  
10/1/86

comprises a step of introducing said feedstock gas and said reductive Si-containing gas into said vacuum atmosphere without introducing said  $\text{NH}_3$  gas.

14. The process for producing a barrier film according to claim 12, wherein, in the step of introducing said reductive Si-containing gas together with said  $\text{NH}_3$  gas and said feedstock gas, said  $\text{NH}_3$  gas is introduced at a flow rate once or more higher than the flow rate of said feedstock gas, and said reductive Si-containing gas is introduced at a flow rate once or more but not more than 10 times higher than the flow rate of said  $\text{NH}_3$  gas.

15. The process for producing a barrier film according to claim 11, wherein, in the step of introducing said reductive Si-containing gas together with said  $\text{NH}_3$  gas and said feedstock gas, said  $\text{NH}_3$  gas is introduced at a flow rate once or more but not more than 5 times higher than the flow rate of said feedstock gas, and said reductive Si-containing gas is introduced at a flow rate 2 times or more but not more than 10 times higher than the flow rate of said  $\text{NH}_3$  gas.

16. The process for producing a barrier film according to claim 12, wherein, in the step of introducing said reductive Si-containing gas together with said  $\text{NH}_3$  gas and said feedstock gas, said reductive Si-containing gas is introduced at a flow rate once or more but not more than 15 times higher than the flow rate of the feedstock gas having said high temperature-melting point metal.

17. The process for producing a barrier film according to claim 11, wherein, in the step of growing the film of the nitride of said high temperature-melting point metal, a diluent gas not reacting with said high temperature-melting point metal and a gas having an oxygen atom in its chemical structure are introduced so that the pressure of said vacuum atmosphere is regulated to 1 Pa or more but not more than 100 Pa.